

for his generalized statement, even when raised into a law and dignified with a name, is not an explanation of the phenomena. Darwin has convinced men of evolution where Lamarck failed and where certainly Dr. Eimer would fail, not because he discovered any law, but because he discovered an intelligible mechanism, an obvious sequence of cause and effect, which could, and probably did, act.

P. C. M.

OUR BOOK SHELF.

The Birds of Dorsetshire: A Contribution to the Natural History of the County. By J. C. Mansel-Pleydell, B.A., F.L.S., &c. 8vo. pp. i-xvi., 1-179. (London and Dorchester: R. H. Porter, 1888.)

Notes on the Birds of Herefordshire, contributed by Members of the Woolhope Club. Collected and Arranged by the late Henry Graves Bull, M.D., &c. pp. i-xxxii., 1-274. (London and Hereford: Jakeman and Carver, 1888.)

COUNTY lists of birds are still the order of the day. First we have Mr. Mansel-Pleydell's book on the Ornithology of Dorsetshire, a very neat little volume, compiled evidently with the greatest care. The author's long acquaintance with the country and his well-known love of natural history have rendered him the most competent authority on the subject, and he has been aided by many well-known naturalists in supplying him with instances of the capture of rare birds, so that the list is a very complete one. The inevitable Great Black Woodpecker (*Picus martius*) of course appears, on Pulteney's authority, but no recent specimen is extant, nor is likely to be. The Pied-billed Grebe (*Podilymbus podiceps*), which was first recorded by ourselves as a British bird, is placed between brackets, and considered to be "extremely doubtful" by the author. All we can say is that we should not have been godfather to the specimen, to add one more doubtful species to the already overburdened British list, unless we had felt tolerably certain of its authenticity, while the fact of the specimen being immature renders its occurrence as a chance wanderer much more probable than if it had been an adult bird in breeding-plumage. The bird has ten times more claim to a place amongst our stragglers than such species as *Picus medius*, *Pycnonotus barbatus*, and dozens of others. A most interesting history is given of the celebrated swannery at Abbotsbury, with a photographic plate, in which the birds are well depicted, but the keeper's face lacks expression! Some pretty woodcuts by Mr. Lodge are interspersed in the text. The author informs us that *Puffinus obscurus* (p. 113) should be *P. griseus*.

Dr. Bull's "Birds of Herefordshire" is one of the most useful of the county lists; for it contains a complete list of British birds, with special notes on the Herefordshire species. A great deal of care has evidently been taken over this book, which is rendered more interesting by the poetical researches of the author. Mr. Phil. Robinson, when he issues a new edition of his "Poets' Birds" will certainly have to consult this work of Dr. Bull, which contains many quotations we have not seen elsewhere.

R. BOWDLER SHARPE.

Geology for All. By J. Logan Lobley, F.G.S., &c. (London: Roper and Drowley, 1888).

THE object of this little book is to give an account of the important facts and deductions in geology, without "unnecessary scientific terminology." That there is room for such a work will not be questioned, and doubtless many who have paid no heed to the subject would

begin to study it if only their lessons were made easy and attractive. This was accomplished in old times by Hugh Miller, and more recently by Canon Kingsley in his charming "Town Geology"; and Mr. Lobley, in his enthusiastic preface, raises the hope that he will follow a similar course, and provide "all intelligent readers" with a simple record of the earth's history. In this respect, however, we are disappointed. The work is a condensed account of the leading geological facts and deductions, arranged much after the fashion of an ordinary text-book. Of its general accuracy and clearness we can speak with confidence; and indeed, through his long connection with the Geologists' Association, the author has had ample opportunities of qualifying himself for his task. The work, however, is more adapted for the young student who wishes to pursue the subject, than for the general reader. We fear the patience of the latter will be tried when he reads the explanations—and not always happy explanations—of outcrops, anticlinals, unconformities, and outliers, for there are no diagrams to give pictorial aid. Nor is the chapter on the composition of rocks likely to prove more readable; for surely the accounts of the physical characters of minerals, and the chemical formulæ, introduce "unnecessary scientific terminology." Again, when we read of the acidic and basic rocks, of the seismic focus and the meizoseismic curve, of the "homocircle (*sic*) or equal-lobed tailed fishes," and of those that present a "heterocircle-tailed character," we feel that the author has not sufficiently carried out his good intentions. In the chapter on metamorphic rocks a popular account might have been given of recent researches in the Highlands, and then perhaps the author would not have remarked that "rarely a reversed-fault is seen."

H. B. W.

Sound, Light, and Heat. By Thomas Dunman.

Electricity and Magnetism. By the same Author. (London: Ward, Lock, and Co., 1888.)

THESE two books are revised reprints of the articles on the subjects which have already appeared in Messrs. Ward, Lock, and Co.'s well known "Universal Instructor." They have been published in their present form for the convenience of students. The work of revision and expansion has been undertaken by Mr. Chapman Jones, the death of the original author having rendered it necessary for other hands to perform this part of the work.

As might be expected, the books are of a popular character, but their value to students of elementary physics does not in the least suffer on this account. The almost entire absence of mathematical statements makes them suitable for the most elementary students.

The method of treatment is that of the orthodox text-book, and there is very little that calls for special remark. They differ mainly from other elementary text-books inasmuch as they are brought quite up to date, especially in electrical matters. The 300 diagrams which are distributed throughout the text, though not of a high order of excellence, will do much towards enlightening the minds of those who read the books.

Though not designed to suit the syllabus of any examining body, they are well adapted for students preparing for the Science and Art Department examinations.

Sea-side and Way-side. By Julia McNair Wright. (Boston: D. C. Heath and Co., 1888.)

THIS little volume is the first of a series of "Nature Readers," intended for the use of beginners in reading. As a rule, the authors of reading-books take little trouble to excite the interest of children. Their object is to bring together a number of simple sentences, and they seem to be indifferent whether the sentences express sense or non-sense. In the present series an attempt will be made to

convey, through reading-lessons, some of the more attractive elementary facts of science; and, if we may judge from the degree of success attained in "Sea-side and Way-side," the volumes are likely to be cordially welcomed in many primary schools in England as well as in the United States. The author has taken, as the subjects of her lessons, crabs, wasps, bees, spiders, and shell-fish; and she has contrived to put into the simplest and most direct language a great deal of really useful and entertaining information. Almost all children find something to interest them in what they are told about the habits of animals, and it is not improbable that these bright and pleasant lessons will implant in a good many young minds the seeds of an enduring love of natural history.

Reminiscences of Foreign Travel. By Robert Crawford. (London: Longmans, Green, and Co., 1888).

MR. CRAWFORD is already favourably known as the author of "Across the Pampas and the Andes." The present volume will maintain his reputation as a traveller who knows how to observe what is most significant in the countries he visits, and who possesses the faculty of reproducing his impressions in a lively and attractive narrative. His reminiscences relate to Canada, Austria, Germany, Sardinia, Egypt, Algeria, and various other lands; and in every chapter he records something that most readers will find fresh and interesting. The most instructive sections of the book are, upon the whole, those relating to Canada and Algeria.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

Dr. Giglioli and Lepidosiren.

DR. GIGLIOLI asserts, in his interesting letter published in the last issue of NATURE (p. 102), that the Lepidosiren whose capture he records is "the fifth specimen known." Reference to his earlier remarks (NATURE, vol. xxxv. p. 343), concerning that which he regards as "the fourth known" specimen, shows that while he has acknowledged the examples of Natterer and Castlenau, he has apparently overlooked that of Bibron and H. Milne-Edwards, recorded in 1840. Readers of NATURE interested in this wonderful creature, now apparently verging on extinction, will find a *résumé* of all that is topographically important concerning the last-named and the three previously recorded specimens in the *Zoolog. Jahrb.* for 1887 (pp. 575 to 583). For this welcome communication, to which a full bibliography is appended, we are indebted to Dr. G. Baur, of Yale College Museum, U.S.A. It forms one of the series of historical miscellanea with which he has enriched our recent literature; and, if the conclusions at which he (in common with Brühl) arrives are sound, Dr. Giglioli's "fifth" specimen will be in reality a sixth.

Zoologists in general will unite in congratulating Drs. Rodriguez and Giglioli upon their recent acquisition; and while hoping for a repetition of the same, they will eagerly await the results of the promised "future study." G. B. HOWES.

South Kensington, June 2.

"A Text-book of Biology."

WILL you allow me to point out that the reviewer, in your issue of May 17 (p. 52), apparently misunderstands the object of my "Text-book of Biology"? The work is not meant to supplant lectures, but to aid them, by reducing for the student the wearisome labour of note-taking, and by enabling the teacher to enlarge where necessary, and to treat the subject from other points of view, running meanwhile less risk of addressing an audience of mere scribbling-machines.

The review also implies that a previously published work

covers the same ground as the present book. This, however, is not the case, as my book deals with the *Botany* as well as with the *Zoology* of the course.

I cannot but think that the reviewer is led by his enthusiasm into the common mistake of demanding that the ordinary "pass" man shall follow the same course as the specialist. I suppose that the University of London prescribes at the Intermediate Pass stage a portion, not too small, of Biology, which shall form part of a general course of science adapted to the average student, and to the time at his disposal; perhaps your reviewer will kindly explain, less vaguely, what other system he would propose to substitute?

J. R. AINSWORTH DAVIS.

Aberystwyth, May 24.

Resistance of Square Bars to Torsion.

THE attention of writers on Applied Mechanics should be called to the error continuously repeated in about thirty editions of the late Prof. Rankine's different works which have appeared during the last thirty years. The error is still reproduced in quite recent works of other writers: Prof. Ewing's article, "Steam-Engine," in the *Encyclopædia Britannica*; Prof. Unwin's "Elements of Machine Design"; Prof. Alexander's "Elementary Applied Mechanics"; &c.

It is stated that the moment of resistance of a square bar to torsion appears from Saint-Venant's investigations to be—

$$0.281 fh^3,$$

where f = maximum intensity of stress, and h = side of the square. This formula is also quoted at discussions of Institutions of Engineers and accepted without dissent. It is easily seen to be wrong, because the moment of torsion of a round bar of equal area is only

$$0.282 fh^3.$$

The error is reproduced in the text of Prof. Cotterill's "Applied Mechanics," but is corrected in an appendix, where the author says Rankine gives the formula without further explanation. The explanation is that on the old theory the torsional moment of inertia was—

$$I = \frac{h^4}{6},$$

which had to be multiplied by the maximum intensity of stress and divided by the corresponding radial distance—namely, from the centre to the middle of the side, giving the moment of resistance

$$= \frac{fh^3}{3}$$

on the old theory. (Rankine was aware that the maximum stress does not occur at the angles, as in Coulomb's method.)

Now, in Saint-Venant's "Mémoire," the *torsional rigidity* of a square bar is proved to be the fraction

$$0.843$$

of the fallacious result of the old theory. Rankine accordingly wrote

$$0.843 \times \frac{fh^3}{3} = 0.281 fh^3$$

as the true moment of torsion.

But the *torsional rigidity* determines the amount of twist, and not the maximum stress. A few pages farther on, Saint-Venant gives the correct formula, equivalent to

$$0.208 fh^3.$$

It seems strange that the talented author of the expressive distinctions *strain* and *stress* should himself have taken the formula for the strain instead of that for the stress. The reason is, that up to that date (Todhunter's "History of Elasticity") the strain and stress were supposed to be proportional to each other.

Abstracts of Saint-Venant's researches are given in Sir William Thomson's article "Elasticity," in the *Encyclopædia Britannica*, Thomson and Tait's "Natural Philosophy," and Minchin's "Statics." Strange that in all of these the method is given which determines the *strain* to be 0.843 of the old fallacy, while nothing is said about what is of more importance in Applied Mechanics, the maximum *stress*, nor the *moment of resistance to torsion*, as given above.

Perhaps this hint may be attended to in future editions.

T. I. DEWAR.

Engineering Academy, 721 Commercial Road, E.